

Reinstatement and revision of *Triplarina* Raf. (Myrtaceae)

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Summary

Bean, A.R. (1995). Reinstatement and revision of *Triplarina* Raf. (Myrtaceae). *Austrobaileya* 4(3): 353–367. The endemic Australian genus *Triplarina* Raf. is reinstated for the species formerly known as *Baeckea camphorata* R.Br. ex Sims, and six allied species. These species form a coherent group, possessing several features which justify their excision from *Baeckea* L. The first available generic name is *Triplarina* Raf. The new combination *T. imbricata* (Sm.) A.R.Bean is made, and six new species and one new subspecies are described; *T. bancroftii*, *T. calophylla*, *T. nitchaga*, *T. nowraensis*, *T. paludosa*, *T. volcanica* and *T. volcanica* subsp. *borealis*. Illustrations and distribution maps are provided for all species. Keys are given to the genera comprising *Baeckea* sens. lat., and to the species of *Triplarina*.

Keywords: Myrtaceae; *Triplarina*, *Baeckea*, *Baeckea camphorata*, *Triplarina bancroftii*, *Triplarina calophylla*, *Triplarina imbricata*, *Triplarina nitchaga*, *Triplarina nowraensis*, *Triplarina paludosa*, *Triplarina volcanica*, *Triplarina volcanica* subsp. *borealis*.

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Introduction

Under the broad circumscription established by Bentham (1867), *Baeckea* L. is a large genus of more than 100 species, mostly confined to Australia, and particularly Western Australia, with a few species in New Caledonia (Guillaumin 1948; Dawson 1992) and Malesia (Ridley 1922; Merrill 1928), and with one species, *B. frutescens* L., extending to southern China. It was this species upon which Linnaeus described the genus in 1753. Subsequently, and especially in the mid-1800's, about 20 genera were erected for various species of the *Baeckea* "complex" to accommodate the floral variation observed by botanists of the time. However these were all reduced by Bentham (1867) either to synonymy or sectional status; his scheme was then followed for over a century.

While many of the genera proposed for *Baeckea*-like plants are considered unwarranted, it is now clear that recognition of a single genus is equally unsatisfactory. Johnson & Briggs (1985) were the first to state that *Baeckea* is polyphyletic. Trudgen (1986) reinstated *Rinzia* Schauer, a genus confined to Western Australia, and then erected the genus *Ochrosperma* (Trudgen 1987). Studies under-

taken by the present author suggest that five genera should be accepted for species of *Baeckea* sens. lat. occurring in eastern Australia, New Caledonia and Malesia. They are *Baeckea* L. sens. str., *Babingtonia* Lindl., *Ochrosperma* Trudgen, *Triplarina* Raf. and *Euryomyrtus* Schauer.

These five genera are characterised as follows:

Baeckea L. sens. str.

calyx lobes simple; stamens 5–12, none opposite centre of petals; filaments straight; anthers versatile, dehiscing by long parallel slits; locules 2 (rarely 3); ovules 6–12 per loculus; seeds straight-sided, discoid to cuboid, angular, not arillate.

Babingtonia Lindl.

calyx lobes often compound; stamens 3–15, none opposite centre of petals; filaments geniculate; anthers adnate to filaments, dehiscing by pores or short divergent slits; locules 3 (rarely 2, but not in the geographical area considered here); ovules 4–18 per loculus; seeds straight-sided, discoid to cuboid, angular, not arillate.

Euryomyrtus Schauer

calyx lobes simple; stamens 3–13, some opposite centre of petals; filaments straight; anthers versatile, dehiscing by long parallel slits; locules 3; ovules 4–5 per loculus; seeds reniform, not angular, not arillate.

Ochrosperma Trudgen

calyx lobes simple; stamens 5–8, none opposite centre of petals; filaments straight; anthers versatile, dehiscing by long parallel slits; locules 3; ovules 2 per loculus; seeds reniform, not angular, arillate.

Triplarina Raf.

calyx lobes simple; stamens 14–18, none opposite centre of petals; filaments straight; anthers versatile, dehiscing by long parallel slits; locules 3; ovules 8–13 per loculus; seeds reniform, not angular, not arillate.

A key to these genera is presented in this paper in which the genus *Triplarina* is reinstated and revised. In future papers, I will deal with species belonging to the other genera mentioned above.

The name *Triplarina* has never been in general usage. For many years, the type species (then known as *Baeckea camphorata*) was the only known species which belongs under this genus. However, from about 1900 and especially in recent years, several more species conforming to the generic characteristics have been found, although none has been formally described until now. *Triplarina* was referred to as the “*B. camphorata*” taxon by Trudgen (1987).

Taxonomic and Nomenclatural History

David Burton, in 1791, made the first known collection of a *Triplarina*, and his specimen became the type of *Leptospermum imbricatum* Sm. (Smith 1802). George Caley and Robert Brown collected the same taxon between 1800 and 1810, with Brown giving it the manuscript name *Baeckea camphorata*. Sims (1826) provided the original valid publication of *Baeckea camphorata*. Although he placed it in *Baeckea*, Sims thought it had “as good a right to rank with *Leptospermum*”, because of the

large number (15) of stamens. Twelve years later, Rafinesque (1838) erected the genus *Triplarina* based on *Baeckea camphorata*. His description was brief, but he stated that *Baeckea* differed from *Triplarina* by having 8–10 stamens, and that *Leptospermum* differed from the new genus by having 20 stamens and alternate foliage.

Schauer (1843) was seemingly unaware of Rafinesque’s genus, because he (Schauer) erected the genus *Camphoromyrtus*, also based on *Baeckea camphorata*. Subsequent treatments by Mueller (1864) and Bentham (1867) did not mention *Triplarina*, even as a synonym, and it is possible they were also unaware of its publication.

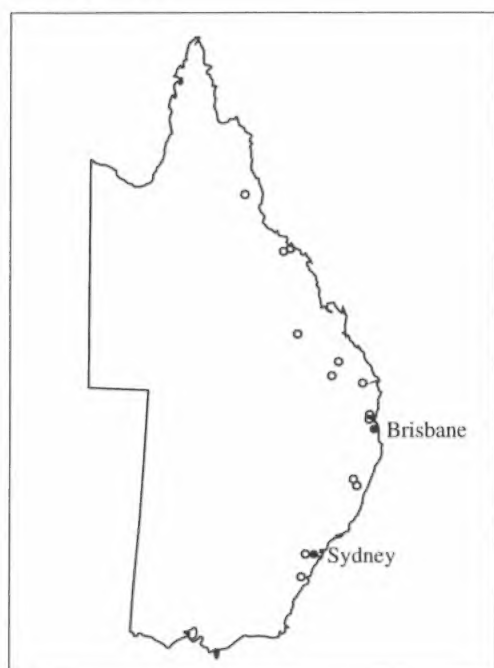
Baillon, in 1862, founded the genus *Eremopyxis*, which he stated was based on *Baeckea camphorata*. Hence it is included here as a synonym of *Triplarina*. It should be noted, however, that the plant he describes would appear to be a species of *Thryptomene* Endl.

Geography and Morphology

The genus *Triplarina* is endemic to Australia, confined to the states of Queensland and New South Wales, from Ravenshoe at latitude 18°S to Nowra at latitude 35°S (**Map 1**). Most species occur within 80 km of the coast, with the exception of *T. paludosa* which grows on an elevated tableland about 180 kilometres inland.

Although the total geographical range of the genus is quite large, its members occur in very small and isolated populations, indicative of a relictual situation in which present-day taxa persist in small areas of remaining suitable habitat. The parent material is sandy acidic soils or skeletal slopes on sandstone, granite or rhyolite. *Triplarina* species occupy sheltered positions within their favoured habitat, such as shady southerly slopes, sandstone gorges, creekbanks, and the bases of granite outcrops which benefit from water runoff, indicating that they are not as drought tolerant as many other heathland plants.

No species occurs on the heathlands which are scattered along the coasts of New South Wales and Queensland on quaternary sands;



Map 1. Distribution of *Triplarina* spp. ○.

instead, *Triplarina* species are found in hilly or mountainous terrain, sometimes in heathland, but usually in woodland or forest, overtopped

by *Eucalyptus* spp. or other sclerophyll tree species.

While leaf size and shape varies within each species, vegetative characters are very useful for assisting in species determination, and some species can be distinguished on these characters alone. Floral morphology is fairly uniform, but diagnostic characters include calyx lobe shape, petal size, connective gland size, ovule number, stamen number and stipe length.

Material and Methods

This study is based upon an examination of herbarium material from A, BM, BRI, K, MEL, NE, NSW and QRS, as well as LINN microfiche. Most species have been examined in the field to establish bark, habit and habitat, and to collect suitable floral material for later herbarium study. Measurements of leaves and fruits are based on dried herbarium specimens, and the leaves measured are those on flowering branches. Measurements of floral parts are based on material preserved in spirit, or reconstituted by boiling them in water. Species treatments are arranged in geographical order, from north to south.

Taxonomy

Key (for eastern Australia, New Caledonia and Malesia) to the genera comprising *Baeckea* s. lat.

1. Ovary and fruit 3-locular 2
Ovary and fruit 2-locular **Baeckea s.str.**
2. Anthers versatile, dehiscing by long parallel slits 3
Anthers adnate, dehiscing by pores or short divergent slits **Babingtonia**
3. Ovules and seeds D-shaped, angular **Baeckea s.str.**
Ovules and seeds reniform, not angular 4
4. Some stamens opposite centre of petals **Euryomyrtus**
No stamens opposite centre of petals 5
5. Ovules 2 per loculus, stamens 5–8 **Ochrosperma**
Ovules 8–13 per loculus, stamens 14–18 **Triplarina**

Triplarina Raf., Sylvatellur. 104 (1838). **Type:** *Triplarina camphorata* (R.Br. ex Sims) Raf.

Camphoromyrtus Schauer, Linnaea 17: 237–42 (1843). **Type:** *Camphoromyrtus brownii* Schauer, nom. illeg. (= *Baeckea camphorata* R.Br. ex Sims).

Eremopyxis Baillon, Adansonia 2: 328–9 (1861–2). **Type:** *Eremopyxis camphorata* (R.Br. ex Sims) Baillon.

Shrubs 1–3 m high, all parts glabrous. Bark grey, scaly or fibrous, persistent. Branchlets more or less terete. Leaves opposite, decussate, exstipulate, microphyllous, glabrous, flat or margins recurved, oil glands obscure on adaxial surface, conspicuous on abaxial surface, scattered or mainly in two parallel rows; margins entire, intramarginal veins and midrib clearly visible or obscure, petioles 0.3–0.9 mm long. Inflorescence axillary, anthotelic, forming metaxydiads, metaxytriads or botryoids. Flowers actinomorphic, bisexual, 5-merous. Peduncles and stipes terete, bracts 2, persistent, apex obtuse; bracteoles 2, conduplicate, ovate, apex acute, caducous, leaving a prominent scar, marking the junction

of stipe and peduncle. Enations numerous at junction of stipe and peduncle. Hypanthium obconical, campanulate or hemispherical, smooth or irregularly ribbed, especially when dry, adnate to ovary, and continuing above ovary summit. Calyx lobes persistent, deltoid, semiorbicular, orbicular or oblong; with a central longitudinal ridge, margins entire. Petals deciduous, white, orbicular or almost so, 1–2.5 mm wide, margins entire. Stamens 14–18, free, in a single whorl, shorter than petals. Filaments terete, slightly tapered towards the apex; anthers versatile, dorsifixed, bilocular, opening by longitudinal slits; connective gland globular, smaller than or as long as anthers. Ovary adnate to hypanthium, except for the distal one-third, inferior, 3-locular, ovules 8–13 per loculus, arranged in two or three longitudinal rows on a peltate placenta. Style simple, terete, 0.7–1.2 mm long, sunken into a pit; stigma capitate, papillose. Fruits capsular, loculicidal, chartaceous, crowned by persistent calyx lobes, mostly hemispherical, non-adnate section senescent, forming a distinct brown rim. Seeds rounded, reniform, tuberculate, not arillate, 0.5–0.8 mm long. Embryo with small cotyledons on a slender neck attached to a massive radicle.

Key to the species of *Triplarina*

1. Leaf apex obtuse or truncate 2
 Leaf apex acute 3
2. Leaves 2.3–3.3 mm wide **T. volcanica** subsp. **volcanica**
 Leaves 1.0–2.0 mm wide 4
3. Leaves oblanceolate, 1.0–1.5 mm wide **T. nitchaga**
 Leaves linear, 0.6–1.0 mm wide **T. paludosa**
4. Stipe length 0.1–0.4 mm 5
 Stipe length 0.5–1.4 mm 6
5. Leaf apex truncate, recurved; calyx lobes deltoid **T. nowraensis**
 Leaf apex obtuse, flat; calyx lobes obtuse to semi-orbicular **T. imbricata**
6. Calyx lobes oblong; hypanthium 1.7–2 mm long **T. volcanica** subsp. **borealis**
 Calyx lobes deltoid, obtuse or semiorbicular; hypanthium 1.2–1.6 mm long 7
7. Petals 1.9–2.7 mm long; stamens 14–15; calyx lobes 0.7–0.9 mm long,
 connective gland about half anther length **T. calophylla**
 Petals 1.4–1.8 mm long; stamens 16–18; calyx lobes 0.4–0.5 mm long,
 connective gland about same length as anthers **T. bancroftii**

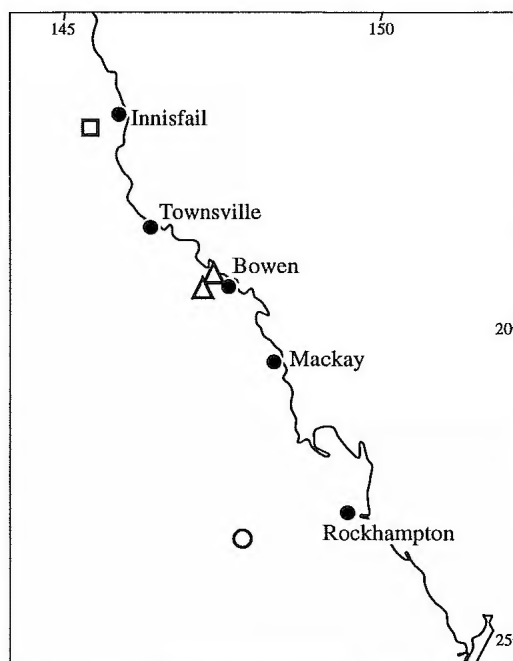
- 1. *Triplarina nitchaga* A.R.Bean sp. nov.,**
Triplarinae paludosae affinis, sed foliis brevioribus latioribusque, sepalis semi-orbicularibus vel deltoideis et hypanthio longiore differt. **Typus:** Queensland. NORTH KENNEDY DISTRICT: Nitchaga Creek, near junction with George Creek, 25 km SSE of Ravenshoe, 3 October 1994, M. Lockyer 308 (holo: BRI; iso: A, CANB, K, MEL, NSW, distribuendi).

Shrub to 2.5 m high. Bark grey, scaly. Leaves oblanceolate, 3.8–5.5 mm long, 1.0–1.5 mm wide, concolorous, flat or concave above, oil glands in 2 rows, midrib and intramarginal veins not visible; apex acute; petioles 0.4–0.6 mm long. Inflorescence comprising 2 or 3 (rarely 4) flowers in each leaf axil, arising separately from a brachyblast. Peduncles 0.8–1.0 mm long, bracts 0.5–0.6 mm long; pedicels 0.6–1.4 mm long, bracteoles 0.8–1.3 mm long. Flowers 4.5–5 mm across. Hypanthium obconical, 1.5–1.9 mm long, smooth when fresh, angular and wrinkled when dry. Calyx lobes semi-orbicular to deltoid, c. 0.5 × 0.8–1 mm, with oil glands. Petals 1.5–2 mm across. Stamens 17–18; filaments c. 1.2 mm long, connective gland c. 0.75 times length of anthers. Ovules 10–13 per loculus in 2 rows. Style 0.8–1 mm long. Fruits hemispherical to obconical, 1.6–1.9 × 2.0–2.5 mm. Seeds brown, 0.5–0.6 mm long. **Fig. 2, P–T.**

Specimens examined: Queensland. NORTH KENNEDY DISTRICT: Ravenshoe, cultivated, ex Nitchaga Creek, Tully Falls road, Dec 1991, *Lockyer* s.n. (BRI); Nitchaga Creek, 6 km S of Tully Falls, Dec 1993, *Forster* PIF 14475 & *Lockyer* (BRI, MEL, QRS); Arthurs Seat, 19 km WSW of Ravenshoe, Sep 1994, *Lockyer* 306 (BRI, MEL, NSW, QRS); Nitchaga Creek, near junction with George Creek, 25 km SSE of Ravenshoe, *Lockyer* 307 (BRI, MEL, NSW, QRS).

Distribution and habitat: *T. nitchaga* is known from only two localities, both in the vicinity of Ravenshoe (**Map 2**). At the type locality, it grows on granite outcrops near a stream, in open forest dominated by *Syncarpia glomulifera* (Sm.) Nied. and *Eucalyptus resinifera* Sm. At Arthurs Seat, it grows on a rhyolite hillside and adjacent dry gully, in open forest dominated by *Eucalyptus citriodora* Hook., *E. abergiana* F.Muell. and *E. acmenoides* Schauer.

Phenology: Flowers are recorded in September and October, and fruits are recorded in December.



Map 2. Distribution of *Triplarina nitchaga* □
T. calophylla △ and *T. paludosa* ○.

Affinities: *T. nitchaga* is closest to *T. paludosa*, both narrow-leaved species. *T. nitchaga* differs by its leaves 1.0–1.2 mm wide (0.6–1.0 mm for *T. paludosa*); leaves 3.8–5.0 mm long (4.0–6.5 mm for *T. paludosa*); hypanthium 1.5–1.9 mm long (1.3–1.4 mm long for *T. paludosa*); and semi-orbicular calyx lobes (orbicular for *T. paludosa*). It is notable in the genus for possessing a large number of ovules (up to 13 per loculus) and for the occasional presence of a botryoid inflorescence, which otherwise occurs only in *T. volcanica*.

Conservation status: 2V according to the criteria of Briggs & Leigh (1988). Both populations are small, and neither is conserved.

The recommended conservation status for this species as defined by the Queensland Nature Conservation Act is vulnerable.

Etymology: Nitchaga is the name of the creek along which the type specimen was collected.

- 2. *Triplarina calophylla* A.R.Bean sp. nov.,**
Triplarinae imbricatae affinis, sed foliis latioribus, petalis majoribus, pedicellis

longioribus et loculis ovulis 10 vel 11 differt. **Typus:** Queensland. NORTH KENNEDY DISTRICT: Mt Abbot, 50 km west of Bowen, 25 October 1992, A.R. Bean 5173 (holo: BRI; iso: AD,DNA,K, MEL,NSW, distribuendi).

Shrub 1.5–2 m high. Bark grey, finely fibrous, persistent. Leaves obovate, 2.6–4.8 mm long, 1.4–2.0 mm wide, concolorous, flat in cross-section, oil glands scattered abaxially, intramarginal veins present; apex obtuse, recurved; petioles 0.4–0.7 mm long. Inflorescence comprising 2 flowers in each leaf axil, arising separately from a brachyblast. Peduncle 1.0–1.2 mm long, bracts persistent, 0.5–0.6 mm long; stipes 0.6–0.8 mm long, bracteoles caducous, c. 0.9 mm long, apex acute. Flowers c. 6 mm across. Hypanthium obconical to campanulate, 1.2–1.6 mm long, smooth when fresh, irregularly ribbed when dry. Calyx lobes straight-sided, obtuse to semi-orbicular, 0.7–0.9 × 1.0–1.3 mm, with oil glands. Petals 1.9–2.7 × 1.7–2.5 mm, shortly clawed. Stamens 14–15; filaments 1.1–1.2 mm long, connective gland globular, c. 0.5 times length of anthers. Ovules 10–11 per loculus, in 2 rows. Style 0.6–0.9 mm long. Fruits hemispherical, 1.5–2.0 × 2.1–2.6 mm. Seeds brown, turgid, c. 0.5 mm long. **Fig. 2, K–O.**

Specimens examined: Queensland. NORTH KENNEDY DISTRICT: Station Hill, Cape Upstart headland, c. 50 km SE of Ayr, Sep 1991, Cumming 11392 (BRI); Mount Abbot, 50 km W of Bowen, Jul 1992, Bean 4754 (BRI,DNA,K, MEL,PERTH).

Distribution and habitat: *T. calophylla* has a restricted distribution in north Queensland, and is known only from Cape Upstart and Mt Abbot, both in the Bowen area (**Map 2**). It inhabits shrublands or woodlands on shallow sandy soils associated with granitic rocks. Associated species include *Bursaria tenuifolia* F.M.Bailey, *Lophostemon confertus* (R.Br.) Peter G. Wilson & J.T.Waterh., *Micraira subulifolia* F.Muell. and *Labichea nitida* Benth.

Phenology: Flowers have been recorded in July and October. Fruits are recorded for July.

Affinities: *T. calophylla* is close to *T. imbricata*, but differs in the leaves 1.4–2.0 mm wide (1.0–1.4 mm for *T. imbricata*); petals 1.9–2.7

mm long (1.5–1.7 mm for *T. imbricata*); stipes 0.6–0.8 mm long (0.1–0.4 mm for *T. imbricata*) and 10–11 ovules per loculus (8–9 for *T. imbricata*). From *T. bancroftii*, it differs by the petals 1.9–2.7 mm long (1.4–1.8 mm for *T. bancroftii*); calyx lobes 0.7–0.9 mm long (0.4–0.5 mm for *T. bancroftii*); stamens 14–15 (16–18 for *T. bancroftii*); and connective gland about half the length of the anthers (equal to or greater than anther length for *T. bancroftii*).

Conservation status: 2R according to the criteria of Briggs & Leigh (1988). Populations on Mt Abbot are not conserved, and only about 1 000 plants exist there (Bean 1994). The collection from Cape Upstart was made just outside Cape Upstart National Park, and while it is probable that *T. calophylla* does extend into the National Park, this cannot be assumed. Its abundance at this site is unknown.

The recommended conservation status as defined by the Queensland Nature Conservation Act is rare.

Etymology: From the Greek, *calo* (beautiful) and *phyllon* (leaf), in reference to the attractive foliage of the species.

3. *Triplarina paludosa* A.R.Bean sp. nov.,
Triplarinae imbricatae affinis, sed foliis linearibus multo longioribus apice acuto, pedicellis longioribus et sepalis orbicularibus differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Blackdown Tableland, 0.7 km N of Horseshoe Lookout, 15 November 1993, A.R. Bean 6932 (holo: BRI; iso: BISH,CANB,K,MEL,MO,NSW, distribuendi).

Illustration: Pearson & Pearson, Plants of Central Queensland p.64 (1989), as *Baeckea* sp. 'Stony Creek Falls'.

Shrub 0.9–1.5 m high. Bark grey, finely fibrous, persistent. Leaves lanceolate to linear, 4.0–6.5 mm long, 0.6–1.0 mm wide, concolorous, concavo-convex in cross-section, oil glands in two distinct rows, midrib and intramarginal veins not visible; apex acute; petioles c. 0.5 mm long. Inflorescence comprising 2 flowers in each leaf axil, arising separately from a brachyblast. Peduncles 0.8–1 mm long, bracts

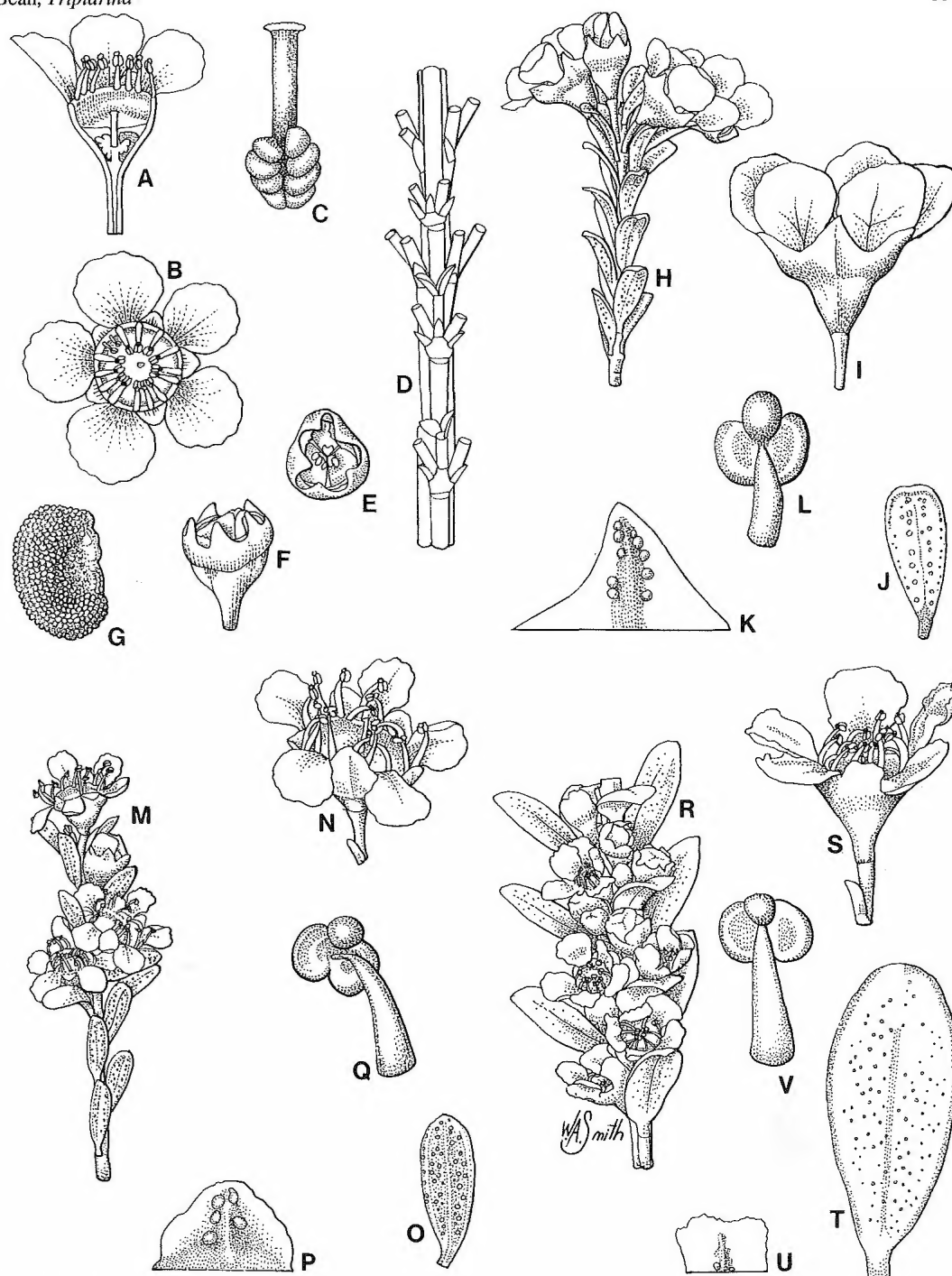


Fig. 1. *Triplarina*, general characteristics. A. half flower $\times 6$. B. flower from above $\times 6$. C. style and ovules $\times 20$. D. stem showing bracts and peduncles $\times 4.5$. E. dehiscent fruit from above, showing undeveloped ovules $\times 6$. F. fruit, oblique view $\times 6$. G. seed $\times 32$. *Triplarina nowraensis*. H. flowering branchlet $\times 3$. I. flower $\times 3$. J. leaf, lower surface $\times 6$. K. calyx lobe $\times 18$. L. stamen $\times 32$. *Triplarina imbricata*. M. flowering branchlet $\times 3$. N. flower $\times 6$. O. leaf, lower surface $\times 6$. P. calyx lobe $\times 18$. Q. stamen $\times 32$. *Triplarina volcanica* subsp. *volcanica*. R. flowering branchlet $\times 3$. S. flower $\times 6$. T. leaf, lower surface $\times 6$. U. calyx lobe $\times 18$. V. stamen $\times 32$. A–D, *Bean* 7220; E–G, *Bean* 6967; H–L, *Rodway* H784; M–Q, *Caley* s.n.; R–V, *Bean* 7220.

c. 0.6×0.2 mm; stipes 1–1.2 mm long, bracteoles c. 0.9 mm long. Flowers 4.5–5 mm across. Hypanthium obconical, 1.3–1.4 mm long, very faintly 10-ribbed when fresh. Calyx lobes nearly orbicular, c. 0.6×0.7 mm, with oil glands. Petals c. 1.5×1.3 – 1.5 mm. Stamens 15–18; filaments c. 1.0 mm long, connective gland 0.75–1 times length of anthers. Ovules 8–11 per loculu in 2 rows. Style 0.9–1 mm long. Fruits hemispherical, c. 1.7×2.0 mm. Seeds pale brown, c. 0.6 mm long. **Fig. 2, F–J.**

Specimens examined: Queensland. LEICHHARDT DISTRICT: Blackdown Tableland, 12 mls [20km] SSE of Bluff, Sep 1959, *Johnson* 1122 (BRI); Blackdown Tableland, 1.5 km S of grid at entrance to SF, Sep 1973, *Hanger* 85 (BRI); Blackdown Tableland, c. 5 km W of Forestry camp, Sep 1973, *Hanger* 523 (BRI); beside Mimosa Creek, Blackdown Tableland, Nov 1973, *Williams* 342 (BRI); Spring Creek, Blackdown Tableland, Nov 1993, *Bean* 6946 (BRI, NSW).

Distribution and habitat: *T. paludosa* is endemic to the Blackdown Tableland, west of Rockhampton in central Queensland (**Map 2**). It grows near creekbanks and on soakage areas, in open forests or woodlands which may be dominated by *Eucalyptus sphaerocarpa* L.A.S. Johnson & Blaxell, *Eucalyptus bunites* Brooker & A.R. Bean, *Casuarina torulosa* Aiton or *Angophora leiocarpa* (G.J. Leach) K.R. Thiele & Ladiges. Associated shrub species include *Banksia oblongifolia* Cav., *Brachyloma daphnoides* (Sm.) Benth. and *Persoonia subtilis* P.H. Weston & L.A.S. Johnson.

Phenology: Flowers in November, fruits in November and December.

Affinities: *T. paludosa* differs from *T. imbricata* by its longer, linear leaves, longer stipes and orbicular calyx lobes. It is closest to *T. nitchaga*, but *T. paludosa* differs by its leaves 0.6–1.0 mm wide (1.0–1.2 mm for *T. nitchaga*), leaves 4.0–6.5 mm long (3.8–5.0 mm for *T. nitchaga*); hypanthium 1.3–1.4 mm long (1.5–1.9 mm for *T. nitchaga*); and nearly orbicular calyx lobes (semi-orbicular for *T. nitchaga*).

Conservation status: Not currently rare or threatened.

Etymology: From the Latin word *paludosus*, meaning marshy; in reference to the species' preference for moist, low-lying areas.

4. *Triplarina bancroftii* A.R. Bean sp. nov., *Triplarinae calophyllae* affinis, sed staminibus numerosioribus, petalis sepalisque minoribus, foliis angustioribus et glandula connectivi majore differt. **Typus:** Queensland. BURNETT DISTRICT: Cania Gorge National Park, near "Dripping Rock", 17 November 1993, A.R. Bean 6966 (holo: BRI; iso: K, MEL, NSW, distribuendi)

Shrub 1.5–2.5 m high. Bark grey, scaly, persistent. Leaves obovate or elliptical, 3.3–6.2 mm long, 1.2–1.9 mm wide, concolorous, flat in cross-section or margins recurved, oil glands obvious abaxially, scattered, midrib and intramarginal veins visible; apex obtuse or truncate, recurved; petioles 0.3–0.5 mm long. Inflorescence comprising 2 or 3 flowers in each leaf axil, arising separately from a brachyblast. Peduncles 0.8–1.4 mm long, bracts persistent, 0.6×0.3 mm; stipes 0.5–0.6 mm long, bracteoles caducous, not seen. Flowers 4.5–4.8 mm across. Hypanthium obconical, 1.4–1.6 mm long, faintly 10-ribbed when fresh. Calyx lobes deltoid to semi-orbicular, 0.4 – 0.5×0.8 – 1.0 mm, with oil glands or glands absent, apex obtuse. Petals 1.4 – 1.8×1.6 – 1.9 mm, not clawed. Stamens 16–18; filaments 0.8–0.9 mm long, connective gland as long as, or slightly longer than anthers. Ovules 8–10 per loculus, in 2 or rarely 3 rows. Style 1–1.5 mm long. Fruits hemispherical, wrinkled or ribbed, 1.5 – 1.7×1.9 – 2.1 mm. Seeds brown, c. 0.5 mm long. **Fig. 2, A–E.**

Specimens examined: Queensland. BURNETT DISTRICT: Cania Gorge NP, about 24 km NW of Monto, Oct 1983, *Henderson* H2955, *Guymer* & *Dillewaard* (BRI); Cania Gorge NP, Nov 1993, *Bean* 6967 (BRI); Eidsvold, Dec 1913, *Bancroft* s.n. (A, BRI); "Melrose", 15 km W of Eidsvold, Aug 1990, *Bean* 2123 (BRI, NSW, PERTH).

Distribution and habitat: *T. bancroftii* has a limited distribution in south-eastern Queensland (**Map 3**). Two populations are known, 80 km apart. The species grows on shallow acidic, sandy soil in all cases, but the parent material may be either granite or sandstone. Associated species include *Lophostemon confertus*, *Lophostemon suaveolens* (Sol. ex Gaertn.) Peter G. Wilson & J.T. Waterh., *Eucalyptus trachyphloia*, *Leptospermum venustum* A.R. Bean and *Leptospermum neglectum* Joy Thomps.

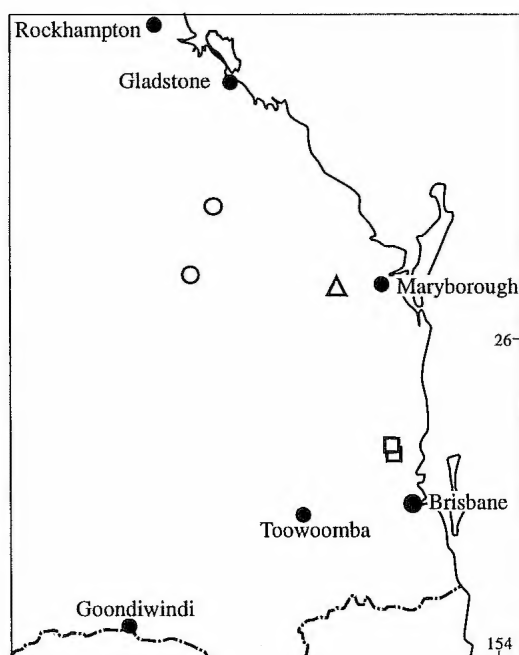
Phenology: Flowering is recorded for October and November.

Affinities: *T. bancroftii* closely resembles *T. calophylla*, but *T. bancroftii* differs by its 16–18 stamens (14–15 for *T. calophylla*); petals 1.4–1.8 mm long (1.9–2.7 mm for *T. calophylla*); calyx lobes 0.4–0.5 mm long (0.7–0.9 mm for *T. calophylla*); and connective gland equal to or longer than anthers (about half anther length for *T. calophylla*).

Conservation status: 2RC according to the criteria of Briggs & Leigh (1988). Neither of the populations is large, but the Cania Gorge population is conserved in a National Park.

The recommended conservation status for this species as defined by the Queensland Nature Conservation Act is rare.

Etymology: The specific epithet honours T.L. Bancroft (1860–1933), pioneer plant collector in Queensland, and the first person to collect this species.



Map 3. Distribution of *Triplarina bancroftii* ○, *T. volcanica* subsp. *volcanica* □ and *T. volcanica* subsp. *borealis* △.

5. *Triplarina volcanica* A.R.Bean sp. nov.,
Triplarinae imbricatae affinis, sed foliis longioribus latoribusque, inflorescentia botryoidea, floribus majoribus et pedicellis longioribus differt. **Typus:** Queensland. MORETON DISTRICT: 2 km north-west of Mt Beerburum, 29 March 1993, A.R. Bean 5888 (holo: BRI; iso: K, L, MEL, NSW, distribuendi).

Baeckea sp. 2, Stanley & Ross, Fl. S.E. Queensl. 2: 125 (1986).

Baeckea sp. (Mt Ngungun S.T. Blake 21216), in Henderson (1994).

Shrub 1–2.5 m high. Bark grey, finely fibrous or scaly, persistent. Leaves elliptical to obovate, 4.6–7.2 mm long, 1.5–3.3 mm wide, discolorous, flat in cross-section, oil glands scattered abaxially, intramarginal veins not visible; apex obtuse, not recurved; petioles 0.6–0.9 mm long. Inflorescence a botryoid or metaxxytriad. Peduncles 1.4–1.5 mm long, bracts persistent, 0.4–1.1 mm long; stipes 0.6–0.7 mm long, bracteoles caducous, 1.0–1.3 × 0.6 mm. Flowers 5–6 mm across. Hypanthium obconical, 1.7–2.0 mm long, smooth or faintly ribbed when fresh. Calyx lobes oblong, 0.5 × 0.7–0.8 mm, with oil glands. Petals 1.8–2.0 × 1.7–2.0 mm. Stamens 14–16; filaments 0.9–1 mm long, connective gland c. 0.5 times length of anthers. Ovules 8–10 per loculus in 2 rows. Style 0.7–1.0 mm long. Fruits hemispherical, c. 1.5 × 2.2 mm. Seeds brown, c. 0.6 mm long. **Fig. 1, R–V.**

Phenology: Flowers and fruits have been recorded for most months of the year, and it appears to have the capacity to flower at any time of year (pers. obs.).

Affinities: *T. volcanica* can be distinguished from other members of the genus by its botryoidal inflorescence, in the terminology of Briggs & Johnson (1979), and its oblong calyx lobes.

Etymology: The specific epithet *volcanica* refers to the volcanic origin of the rock upon which this species is confined.

While the Glasshouse Mountains and the Mt Walsh populations are florally identical, they are easily distinguishable by their leaf width and bract length. These differences are not considered to be sufficient to accord them both species status, but subspecific rank is considered appropriate.

The two subspecies are recognisable as follows:

Leaves 2.3–3.3 mm wide, bracts 0.7–1.1 mm long **T. volcanica** subsp. **volcanica**
 Leaves 1.5–2.1 mm wide, bracts 0.4–0.6 mm long **T. volcanica** subsp. **borealis**

5a. *Triplarina volcanica* subsp. *borealis*
A.R.Bean subsp. nov. A *T. volcanica*
 subspecie *volcanica* foliis angustioribus
 et bracteis brevioribus differt. **Typus:**
 Queensland. WIDE BAY DISTRICT: base of
 Biggenden Bluff, May 1931, White 7731
 (holo: BRI; iso: A).

Leaves obovate to oblanceolate, 4.1–7.2 ×
 1.5–2.1 mm, floral bracts 0.4–0.6 mm long.

Specimens examined: Queensland. WIDE BAY DISTRICT:
 Mt Walsh, 6.5 km S of Biggenden, May 1977, Telford 5339
 & Ellyard (CBG, NSW, PERTH); Mt Walsh N.P. south of
 Biggenden, May 1994, Bean 7692 & Forster (BRI, CANB,
 MEL, NSW).

Distribution and habitat: *T. volcanica* subsp.
borealis has been collected only from Mt Walsh
 and Biggenden Bluff, near Biggenden (**Map 3**).
 It is also reported to occur on Mt Goonaneman
 NE of Biggenden (P. Young, pers. comm.). It
 grows in heathland communities, on skeletal
 soil. The parent material is granite. Associated
 species include *Eucalyptus gummifera* (Gaertn.)
 Hockr., *Leucopogon rupicola* C.T.White and
Kunzea flavescens C.T.White & Francis.

Conservation status: 2RC according to
 the criteria of Briggs & Leigh (1988). The
 conservation status for this subspecies as de-
 fined by the Queensland Nature Conservation
 Act is rare.

Etymology: The subspecific epithet *borealis*
 is from the Latin word meaning northern and
 refers to the more northerly distribution of this
 subspecies.

5b. *Triplarina volcanica* A.R.Bean subsp.
volcanica

Leaves obovate to elliptical, 5.4–7.0 × 2.3–3.3
 mm, floral bracts 0.7–1.1 mm long.

Selected specimens: Queensland. MORETON DISTRICT:
 Glasshouse Mts, Aug 1914, White s.n. (A); Coochin Hills,
 near rocky summit of east peak, Aug 1968, Smith 14037
 (BRI, NSW); [Mt] Ngungun, on shoulder on SE spur, Aug

1968, Smith 14003 (BRI); Mt Ngungun, Mar 1960, Blake
 21216 (BRI, NSW); Ngungun, Glasshouse Mtns, Jul 1930,
 Hubbard 3359 (A, BRI); halfway up north face of Mt
 Beerwah, Sep 1968, Willis s.n. (BRI, MEL); northern slopes
 of Mt Beerwah, Dec 1989, Bean 1253 (BRI); Wild Horse
 Mountain, NE of Beerburum, Apr 1993, Bean 5917 (BRI);
 2 km NW of Mt Beerburum, Mar 1993, Bean 5884 (BRI,
 CANB, MEL, NSW); Mt Tunbubudla, Glasshouse Mts, Aug
 1930, Hubbard 3613 (A); Mt Tunbubudla, west of
 Beerburum, May 1993, Bean 6046 (BRI, NSW).

Distribution and habitat: *T. volcanica* subsp.
volcanica is endemic to the Glasshouse
 Mountains just north of Brisbane, and is known
 from most of the peaks (**Map 3**). It grows in
 heathland communities, on skeletal soil. The
 parent material is trachyte. Some commonly
 associated species are *Eucalyptus trachyphloia*
 F.Muell., *Calytrix tetragona* Labill.,
Leptospermum microcarpum Cheel and
Leptospermum luehmannii F.M.Bailey.

Notes: This is the most commonly collected
 taxon of *Triplarina*, and is the only taxon which
 has come into general cultivation as an
 ornamental shrub, usually with the misapplied
 name *Baeckea camphorata*. It has the largest
 leaves (in terms of surface area) of the genus.

Conservation status: No conservation coding
 is assigned. Several populations are protected
 within National Park, and still others occur
 in State Forest where they are unlikely to be
 disturbed.

6. *Triplarina imbricata* (Sm.) A.R.Bean comb.
nov.; *Leptospermum imbricatum* Sm.,
 Trans. Linn. Soc. London 6: 300 (1802).
Type: New South Wales. Port Jackson,
 1791, D. Burton s.n. (holo: LINN, micro-
 fichel; iso: BM!)

Baeckea camphorata R.Br. ex Sims, Bot.
 Mag. 53, t. 2694 (1826) **synon. nov.;**
Triplarina camphorata (R.Br. ex
 Sims) Raf., Sylva tellur. 104 (1838);
Camphoromyrtus brownii Schauer, nom.
 illeg., Linnaea 17: 240 (1843); *Eremopyxis*

camphorata (R.Br. ex Sims) Baillon, *Adansonia* 2: 329 (1861–2). **Type:** t. 2694, Bot. Mag. 53 (1826), excluding Fig. 1.5 (lecto: here designated).

Shrub up to 2.8 m high. Bark grey, scaly to subfibrous. Leaves narrowly obovate, 2.6–3.9 mm long, 1.0–1.4 mm wide, concolorous, flat in cross-section, oil glands scattered abaxially, with no line of glands around the leaf margin; midrib faintly visible, intramarginal vein not visible, apex obtuse, not recurved; petioles 0.4–0.6 mm long. Inflorescence consisting of 2 flowers in each leaf axil, arising separately from a brachyblast. Peduncles 0.8–1.5 mm long, bracts c. 0.5 mm long; stipes 0.1–0.4 mm long, bracteoles caducous, not seen, but leaving a prominent scar marking junction of stipe and peduncle. Flowers c. 4 mm across. Hypanthium obconical, 1.5–1.6 mm long, smooth. Calyx lobes obtuse to semiorbicular, 0.5–0.7 × 0.8–1 mm, with oil glands. Petals elliptical to orbicular, 1.5–1.7 × 1.3–1.7 mm. Stamens 14–17; filaments c. 0.6 mm long, connective gland c. 0.5 times length of anthers. Ovules 8–9 per loculus, in 2 rows. Style 1.1–1.8 mm long. Fruits hemispherical, c. 1.7 × 2.4 mm. Seeds brown, c. 0.5 mm long. **Fig. 1, M–Q.**

Specimens examined: New South Wales, North Coast: Nymboida River, upstream from Nymboida, Oct 1978, Grieves s.n. (NSW); Nymboida River, near Bibiranga road, 11 km S of Nymboida, May 1994, Bean 7717 (BRI); The Battery, Little Nymboida R., 10 km N of Timmsvale, Dec 1990, Williams s.n. (NE). Central Coast: Parramatta, Nov 1801, Caley (BM); Parramatta, Feb 1803, Caley (BM); near Parramatta, Nov 1803, Brown (BM, BRI, K, NSW); Parramatta, Dec 1808, Caley (A); N.S. Wales, s.d., Gov. Phillip (K); Parramatta, s.d., Woolls (K).

Distribution and habitat: *T. imbricata* has been collected from only two locations; Parramatta (near Sydney) and south of Nymboida (**Map 4**). At the Nymboida sites, it grows on rocky riverbanks, as an understorey plant in low open forest in association with *Tristaniopsis laurina* (Sm.) Peter G. Wilson & J.T. Waterh., *Backhousia myrtifolia* Hook., *Ligustrum sinense* Lour. and *Boronia rosmarinifolia* Endl. The habitat for the Parramatta plants is given by Robert Brown as “ad ripis saxosis rivuli”, which means “near the rocky banks of the little river”.

Phenology: Flowering is recorded for November and December. Fruits are borne in February.

Notes: The element upon which the original validating description of *Baeckea camphorata* is based, was a cultivated plant examined by Sims and then illustrated in the Botanical Magazine. No specimen of the cultivated plant is known to exist, hence the illustration, excluding Fig 1.5, is designated here as lectotype. Figure 1.5 illustrates a 5-locular ovary. However, all flowers and fruits that I have examined are 3-locular.

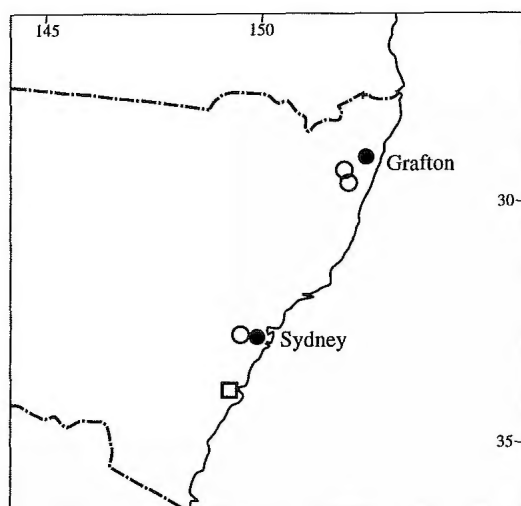
This species is not conspecific with *Baeckea imbricata* (Gaertn.) Druce, as was indicated by Thompson (1989). *Baeckea imbricata* is based on *Jungia imbricata* Gaertn.

Affinities: *T. imbricata* has the smallest leaves (on average) of all *Triplarina* species. It is of similar appearance to *T. calophylla*, but *T. imbricata* has 8–9 ovules per loculus (10–11 for *T. calophylla*) and stipes 0.1–0.4 mm long (0.6–0.8 mm for *T. calophylla*).

T. imbricata differs from *T. nowraensis* by its hypanthium 1.5–1.6 mm long (1.8–2.0 mm for *T. nowraensis*); 8–9 ovules per loculus (10–12 for *T. nowraensis*); petals 1.5–1.7 mm long (2.0–2.4 mm for *T. nowraensis*); semi-orbicular calyx lobes (deltoid for *T. nowraensis*) and scattered foliar oil glands (in parallel lines for *T. nowraensis*).

Conservation status: 2E according to the criteria of Briggs & Leigh (1988). The species is probably extinct in the Sydney area, as no herbarium collections following that of W. Woolls (probably in the 1850's) are known. Parramatta is a well collected locality, and the area has been subject to botanical survey, but no populations of *T. imbricata* are currently known (D. Benson, pers. comm. 1994). Riverbanks (which are the habitat of this species) are commonly subject to early invasion by exotic weeds, and it is likely that all Parramatta populations of *T. imbricata* have long since been overwhelmed.

The number of plants present in the Nymboida area is seemingly very few; the author has been able to locate just 30 plants in 2 populations along the Nymboida River. Furthermore, it is under threat there from exotic weeds, notably *Ligustrum sinense* Lour. and *Lantana camara* L.



Map 4. Distribution of *Triplarina imbricata* ○ and *T. nowraensis* □.

- 7. *Triplarina nowraensis* A.R.Bean sp. nov.,**
Triplarinae imbricatae affinis, sed foliis
 latoribus truncatis, glandulis oleosis in
 ordinationibus linearibus, hypanthio
 longiore, loculo ovulis 10–12, glandula
 connectivi minore et sepalis deltoideis
 differt. **Typus:** New South Wales. SOUTH
 COAST: east of Flat Rock Dam, Nowra, 27
 November 1994, K. Mills s.n. (holo: BRI;
 iso: NSW, distribuendi)

Illustration: Harden (ed.), Fl. of N.S.W. 2: 183
 (1991), as *Baeckea camphorata*.

Shrub to 3.5 m high. Bark grey and scaly on
 branchlets. Leaves obovate to oblanceolate,
 3.4–5.0 mm long, 1.2–1.7 mm wide, slightly
 discolorous, large oil glands in two parallel
 rows either side of midrib, with numerous
 smaller glands lining the leaf margin,
 intramarginal vein not visible, apex of leaf
 truncate, recurved; petioles 0.4–0.6 mm long.
 Inflorescence comprising 2 flowers in each
 leaf axil, arising separately from a brachyblast.
 Peduncles 1.2–3.5 mm long, bracts leaf-like,
 obovate, c. 0.9 mm long; stipes c. 0.3 mm long,
 bracteoles somewhat persistent, 1.1–1.5 mm
 long. Flowers c. 4.5 mm across. Hypanthium
 obconical, 1.8–2.0 mm long, smooth. Calyx
 lobes deltoid, 0.7 × 0.9–1.0 mm, with oil glands,
 apex obtuse. Petals 2.0–2.4 × 2.0–2.2 mm.
 Stamens 15–17; filaments c. 0.6 mm long,

connective gland c. 3 times length of anthers.
 Ovules 10–12 per loculus in 2 rows. Style c. 0.9
 mm long. Fruits hemispherical, 2.0–2.9 × 2.1–2.8
 mm, wrinkled but not ribbed, valves exceeding
 rim but not exceeding calyx lobes. Seeds brown,
 0.6–0.8 mm long. **Fig. 1, H–L.**

Specimens examined: New South Wales. CENTRAL COAST:
 near Nowra, Dec 1924, Rodway s.n. (A); in sandstone
 country near Nowra, Dec 1929, Rodway s.n. (K); Illaroo
 road, 10 mls [16 km] W of Nowra, Dec 1935, Rodway 2098
 (A,K); 'Bundanon', west of Nowra, Nov 1985, Mills s.n.
 (NSW). South Coast: Nowra Ck, Yalwal Road, west of
 Nowra, March 1925, F.A. Rodway s.n. (NSW); Flat Rock
 Creek, 3 mls [5 km] from Nowra on Yalwal road, Dec 1932,
 Rodway 988 (K); Nowra tip, west of Nowra, Mar 1990,
 Mills s.n. (NSW); Nowra tip on Yalwal Road, 500 m down
 from back of pit, Dec 1994, Denham s.n. (BRI,NSW);
 Wombat Flat Fire road, Boolijong Creek Valley, SW of
 Nowra, Nov 1994, Mills s.n. (BRI,MEL,NSW).

Distribution and habitat: *T. nowraensis* is
 known only from the area just to the west and
 south-west of Nowra in New South Wales (**Map**
4). The habitat is heathland close to stream
 channels or swampy slopes, and commonly
 associated species include *Leptospermum*
polygalifolium Salisb., *Melaleuca linariifolia*
 Sm., *Melaleuca thymifolia* Sm., *Baeckea virgata*
 (J.R.Forst. & G.Forst.) Andrews and *Kunzea*
ambigua (Sm.) Druce. The surrounding
 vegetation is eucalypt woodland.

Phenology: Flowers are recorded for
 November–December, and fruits have been
 recorded from December to March.

Affinities: *T. nowraensis* is close to *T. imbricata*,
 but differs by its leaves 1.2–1.7 mm wide
 (1.0–1.4 mm for *T. imbricata*) with a truncate
 apex (obtuse for *T. imbricata*), and oil glands
 distributed in lines either side of the midrib
 (scattered for *T. imbricata*); hypanthium
 1.8–2.0 mm long (1.5–1.6 mm for *T. imbricata*);
 10–12 ovules per loculus (8–9 for *T. imbricata*);
 petals 2.0–2.4 mm long (1.5–1.7 mm for
T. imbricata); somewhat persistent bracteoles
 (extremely caducous in *T. imbricata*); deltoid
 calyx lobes (semi-orbicular for *T. imbricata*)
 and smaller connective gland.

Conservation status: 2V according to the
 criteria of Briggs & Leigh (1988). The species
 is known only from five small populations in the
 immediate Nowra area, and is not known from

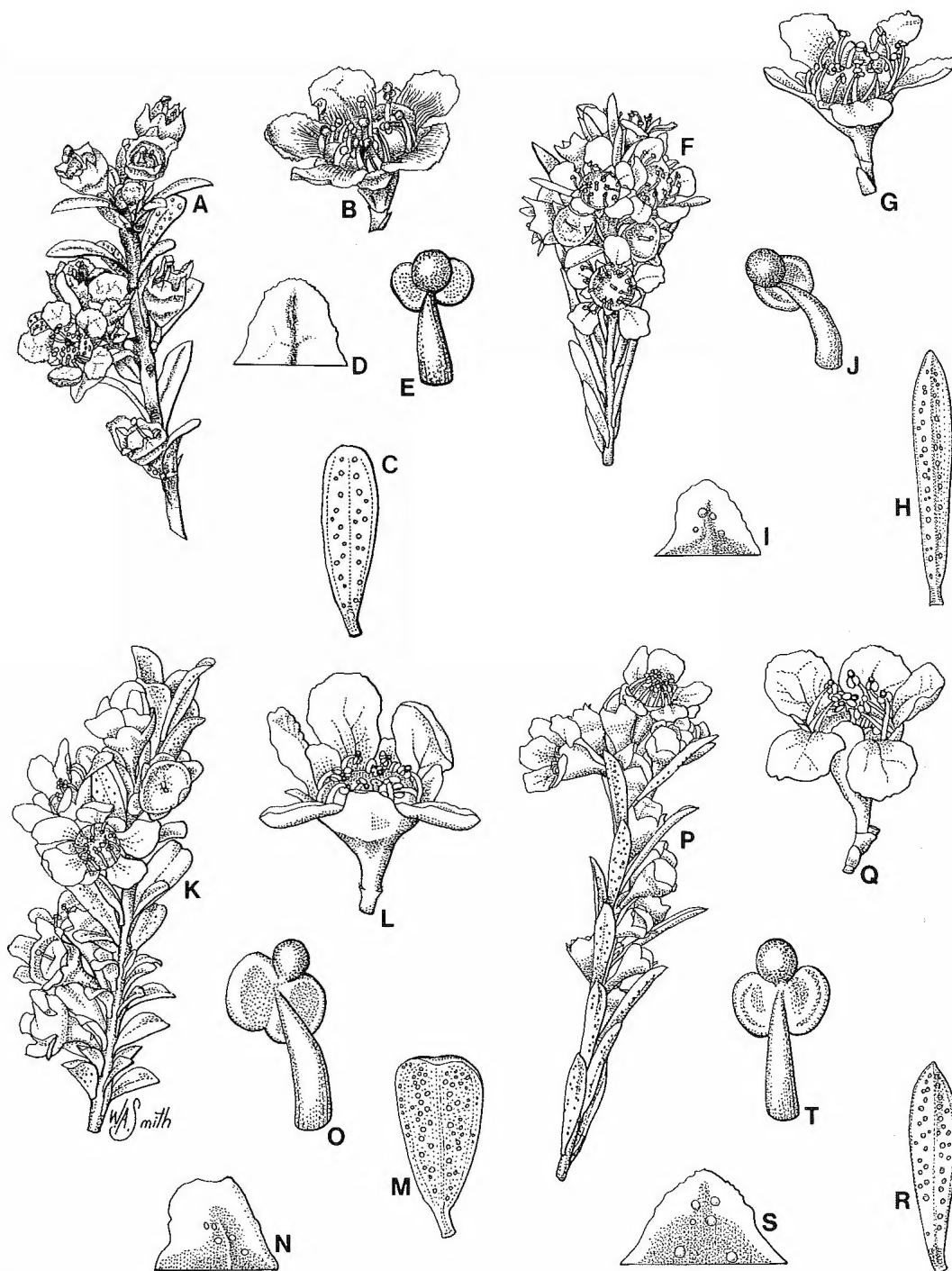


Fig. 2. *Triplarina bancroftii*. A. flowering branchlet $\times 3$. B. flower $\times 6$. C. leaf, lower surface $\times 6$. D. calyx lobe $\times 18$. E. stamen $\times 32$. *Triplarina paludosa*. F. flowering branchlet $\times 3$. G. flower $\times 6$. H. leaf, lower surface $\times 6$. I. calyx lobe $\times 18$. J. stamen $\times 32$. *Triplarina calophylla*. K. flowering branchlet $\times 3$. L. flower $\times 6$. M. leaf, lower surface $\times 6$. N. calyx lobe $\times 18$. O. stamen $\times 32$. *Triplarina nitchaga*. P. flowering branchlet $\times 3$. Q. flower $\times 6$. R. leaf, lower surface $\times 6$. S. calyx lobe $\times 18$. T. stamen $\times 32$. A–E, Bean 6966; F–J, Bean 6932; K–O, Bean 5173; P–T, Lockyer s.n. (AQ 549740).

any conservation reserve. Known threats include urban development, sedimentation and road widening. The type population comprises some thousands of plants, but all other known populations are much smaller. (K. Mills pers. comm.).

Etymology: The specific epithet refers to the occurrence of the species near the town of Nowra, New South Wales.

Imperfectly known Taxon

The following appears to be a distinct species, but in the absence of fertile material, no firm judgement can be made.

Triplarina sp.

Shrub 2 m high. Bark grey, persistent. Leaves linear-lanceolate, 4–4.5 × 0.9–1 mm, oil glands in two vertical rows on abaxial surface; apex acute.

Specimen examined: Queensland. BURKE DISTRICT: Bertya Creek, W of “Warang”, White Mountains NP, 20°27'S, 144°46'E, Jun 1992, *Bean* 4604 (BRI).

Distribution and habitat: This taxon was observed in two places in the White Mountains NP, where it is probably endemic. It grows in steep-sided sandstone gullies or gorges, in association with *Lophostemon suaveolens* and *Beyeria viscosa* var. *obovata* C.T.White.

Acknowledgements

I wish to thank several people for their assistance. Dr Kevin Mills collected specimens of *T. nowraensis* at my request and supplied information about it. Belinda Pellow kindly forwarded a specimen of *T. nowraensis*. Michael Lockyer collected specimens of *T. nitchaga* at my request. Paul Forster commented on a draft of this manuscript. Ian Brooker helped to decipher a difficult Latin phrase and provided the Latin diagnoses. Laurie Jessup (Australian Botanical Liaison Officer) located and photographed a reputed type specimen of *Baeckea camphorata*. I thank the directors of A, BM, K, NE, NSW, QRS & MEL for the loan of specimens and/or access to their herbaria.

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